



# AFRICAN CENTERS OF EXCELLENCE IN BIOINFORMATICS

## KAMPALA, UGANDA

SUPPLEMENTAL TRAINING IN BIOINFORMATICS  
MSB 7104: Online Bioinformatics and Sequence Database  
Topic: Advanced Literature Search (PubMed)  
(Practical learning - April 2021)

# Today's Instructor

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# Objectives

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- Serve as supplemental training in bioinformatics to students enrolled in course MSB 7104: Online Bioinformatics and Sequence Database (Kampala, Uganda).
- Demonstrate methods for search and retrieval of literature from PubMed and related resources
- Practice management of literature using NCBI and Mendeley



# Agenda

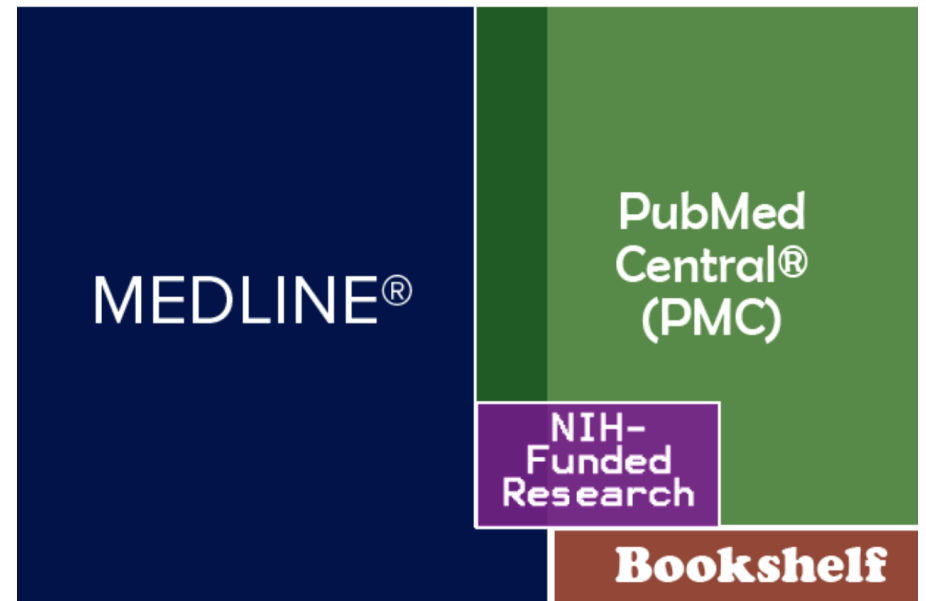
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1. Overview of PubMed.gov <https://pubmed.ncbi.nlm.nih.gov/>
2. Exercises
  - a) Run a general search using a keyword to get familiar with the interface
  - b) Run a Clinical Search and get full text for articles
  - c) Build a query using the “advanced search” tool
  - d) Create a collection and alert in myNCBI
  - e) Get introduced to [Mendeley](#) (an alternative to myNCBI)
  - f) Get introduced to EDIRECT command line search tools

# What is PubMed?

*PubMed is a free resource supporting the search and retrieval of biomedical and life sciences literature with the aim of improving health—both globally and personally.*

- History
  - Developed by NCBI and National Library of Medicine (NLM) at NIH. Available since 1996.
- Status
  - Contains articles from >5000 biomedical journals
  - 32 million citations
- MEDLINE (Literature Selection Technical Review Committee)
  - selects journals based on scope, quality, intended audience
- PubMed Central
  - free online archive of biomedical and life sciences journals
- Bookshelf
  - full text archive of books, reports, databases, and other biomedical/health/life sciences docs



<https://www.nlm.nih.gov/oet/ed/pubmed/quick tours/whatsin/index.html>

# myNCBI - Log in

<https://pubmed.ncbi.nlm.nih.gov/>

NIH National Library of Medicine  
National Center for Biotechnology Information

PubMed.gov

Advanced

Search

User Guide

Log in

NIH U.S. National Library of Medicine NCBI National Center for Biotechnology Information

**⚠ Login Update Warning**  
Important changes to how you login to NCBI coming in June. [Read more here.](#)

Welcome back!

Log in again with Google Account

or

eRA Commons

Google Account

ORCID

Login.gov

Microsoft

Facebook

NIH NIH Account

NCBI Account

more login options

# PubMed Search

- Enter Search term
- Create alert
- Limit by recent years
- Limit by Free full text
- Save citations

Save • Email Send to

## Save citations to file

Selection: Selection (3)

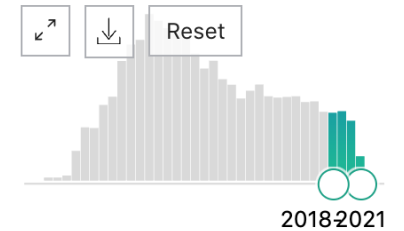
Format: Summary (text)

Create file

Cancel

MY NCBI FILTERS

RESULTS BY YEAR



Library of Medicine  
for Biotechnology Information

helicobacter pylori ulcers

Advanced Create alert Create R

Save

Email

Send to



Find

Advanced Search

Clinical Queries

Single Citation Matcher

# Advanced Search

Try your own search!

PubMed Advanced Search Builder

PubMed.gov

[User Guide](#)

Filters applied: Free full text. [Clear all](#)

Add terms to the query box

Journal



Cell



AND



[Show Index](#)

Query box

("Helicobacter pylori") AND (cancer[MeSH Major Topic])



Search



Use "AND" or "OR"



# Mendeley

*mendeley.com*

1- Sign in



**DISCOVERY**

Mendeley brings your research to life, so you can make an impact on tomorrow

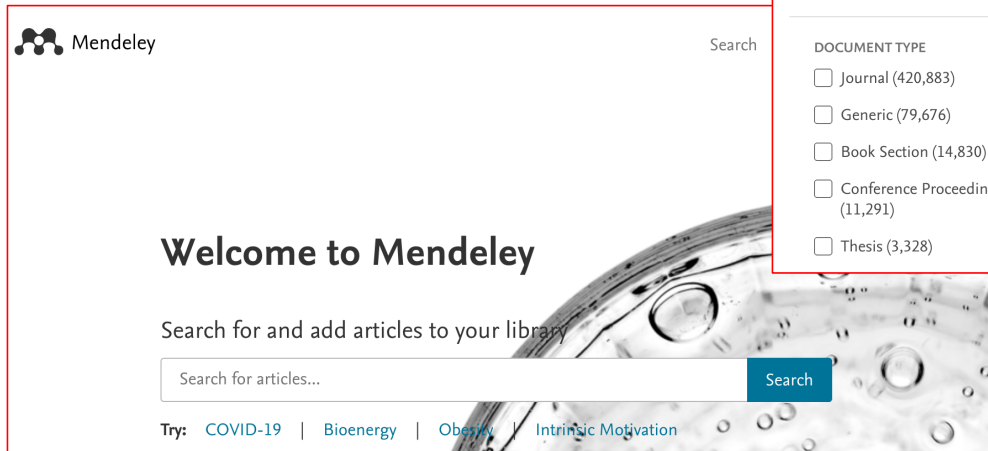
Search over 100 million cross-publisher articles and counting

Search for articles

Popular searches: [COVID-19](#) | [Bioenergy](#) | [Obesity](#)

[Create a free account](#)

2- Search



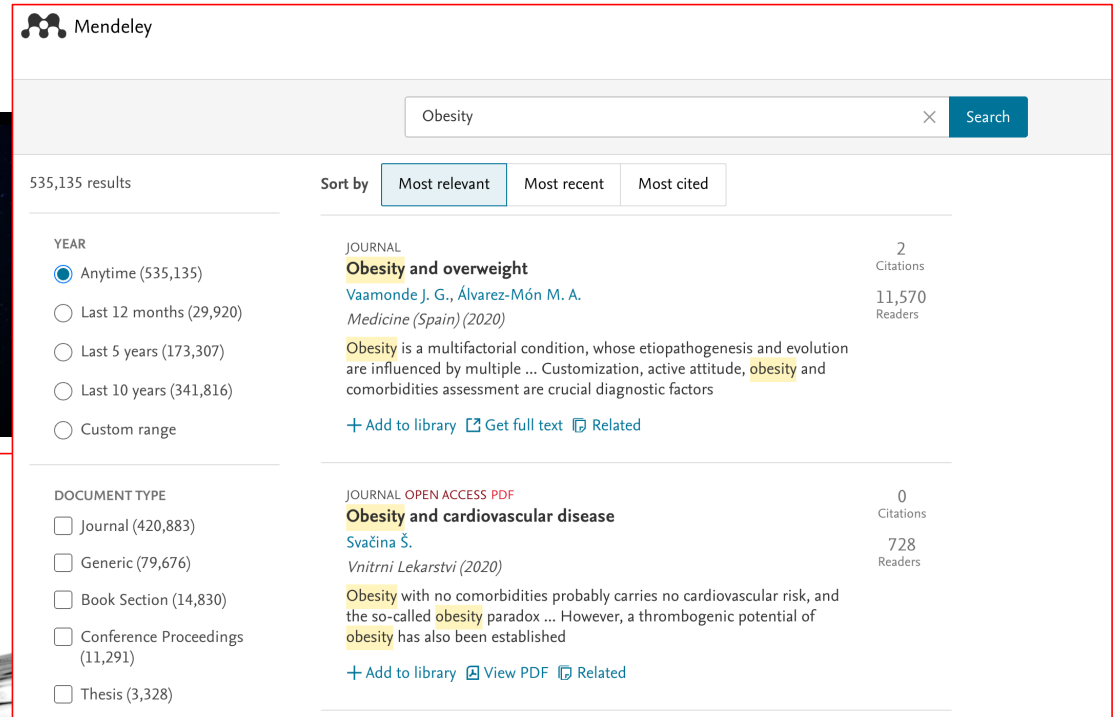
Mendeley Search

## Welcome to Mendeley

Search for and add articles to your library

Search for articles...

Try: [COVID-19](#) | [Bioenergy](#) | [Obesity](#) | [Intrinsic Motivation](#)



Mendeley

Obesity

535,135 results

Sort by

YEAR	DOCUMENT TYPE	JOURNAL	Citations
<input checked="" type="radio"/> Anytime (535,135)	<input type="checkbox"/> Journal (420,883)	<b>Obesity and overweight</b>	2
<input type="radio"/> Last 12 months (29,920)	<input type="checkbox"/> Generic (79,676)	Vaamonde J. G., Álvarez-Món M. A.	11,570
<input type="radio"/> Last 5 years (173,307)	<input type="checkbox"/> Book Section (14,830)	<i>Medicine (Spain)</i> (2020)	Readers
<input type="radio"/> Last 10 years (341,816)	<input type="checkbox"/> Conference Proceedings (11,291)	Obesity is a multifactorial condition, whose etiopathogenesis and evolution are influenced by multiple ... Customization, active attitude, obesity and comorbidities assessment are crucial diagnostic factors	
<input type="radio"/> Custom range	<input type="checkbox"/> Thesis (3,328)	<a href="#">+ Add to library</a> <a href="#">Get full text</a> <a href="#">Related</a>	
		<b>Obesity and cardiovascular disease</b>	0
		Svačina Š.	728
		<i>Vnitřní Lekarství</i> (2020)	Readers
		Obesity with no comorbidities probably carries no cardiovascular risk, and the so-called obesity paradox ... However, a thrombogenic potential of obesity has also been established	
		<a href="#">+ Add to library</a> <a href="#">View PDF</a> <a href="#">Related</a>	

# What is EDIRECT?

*Entrez Direct (EDirect) provides access to the NCBI's suite of interconnected databases (publication, sequence, structure, gene, variation, expression, etc.) from a Unix terminal window*

Navigation programs (**esearch**, **elink**, **efilter**, and **efetch**) communicate by means of a small structured message, which can be passed invisibly between operations with a Unix pipe. The message includes the current database, so it does not need to be given as an argument after the first step.

Explore manual pages:  
**esearch -help**  
**efetch -help**

## Examples:

1. Search and export reference in medline format:

```
$ esearch -db pubmed -query "tn3 transposition immunity" | efetch -format medline
```

2. Search and extract references in last 10 days

```
$ esearch -db pubmed -query "COVID-19 uganda" | efilter -days 10 | efetch -format abstract
```

3. Search for articles, then link to proteins mentioned

```
$ esearch -db pubmed -query "SARS-CoV-2" | elink -related | elink -target protein
```

4. Search for related proteins starting from the PubMed search, filtering for organism and "transmembrane". Optional: use grep to filter for human proteins

```
$ esearch -db pubmed -query "angiotensin-converting enzyme 2" | elink -related | elink -target protein | efilter -query "transmembrane protease" | efilter -organism mammals -source refseq | efetch -format fasta | grep 'Homo sapiens'
```



# References

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1. PubMed overview  
<https://www.nlm.nih.gov/oet/ed/pubmed/quick tours/whatsin/index.html>
2. Entrez Direct: E-utilities on the Unix Command Line  
<https://www.ncbi.nlm.nih.gov/books/NBK179288/>
3. Clinical Queries  
<https://www.nlm.nih.gov/oet/ed/pubmed/quick tours/treatment/index.html>
4. Create alerts for searches  
<https://www.nlm.nih.gov/oet/ed/pubmed/quick tours/alerts/index.html>
5. MyNCBI  
<https://www.youtube.com/watch?v=ks46w3mNAQE>



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**Questions?**  
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